

when it fell, and which points to the ashes having been accompanied by an invisible cloud of sulphur dioxide on their emission from the crater, so that they mechanically occluded some of the gas. The ash gave no effervescence with a powerful acid, the action of the acid being closely watched under the microscope,<sup>1</sup> so that carbonates, such as limestone, and ammonium carbonate seem entirely absent. Finally, the drift of the ash against the wind will have been already noticed. This was due, one would naturally suppose, to the existence of a contrary upper current of air into which the ashes were projected, as they were, indeed, in the great eruption of 1812, when, in spite of the N.E. wind blowing strongly at the time, the ashes fell on the Azores, some hundreds of miles eastward of La Soufrière of St. Vincent.

Eton, Bucks, May 27.

T. C. PORTER.

### III.

The dust from the Soufrière, which fell in Barbados on May 7 and 8, appears to be composed of fragments of glassy and pumiceous lava, broken crystals of plagioclase feldspar, augite and hypersthene, much magnetite, often in perfect octahedra, and a very few crystals of brown hornblende. The feldspars range in specific gravity from labradorite to anorthite. Hypersthene is the predominating coloured silicate.

Dust from the eruption of 1812 also collected in Barbados is of much finer grain, but evidently composed of the same minerals with the green augite in smaller proportion.

The magma appears to have been of the nature of hypersthene-andesite, a rock exceedingly common among the recent lavas of American volcanoes. Further, the magma seems to have remained practically unchanged in composition during the Soufrière's ninety years of dormancy.

University of Edinburgh.

J. D. FALCONER.

### RECORDS OF RECENT ERUPTIONS.

FROM accounts which have been published during the past week, some additional details referring to the character and effects of the recent volcanic eruptions in the West Indies have become available and are here brought together.

A letter from Mr. A. D. Whatman, one of the members of the Government relief expedition to Martinique, describes some of the events as related to him by one of the survivors of the steamship *Roraima*, which was about 150 yards from the shore when the catastrophe occurred at St. Pierre. It appears that a little before 8 a.m. on May 8 an explosion was heard, and immediately the whole place was in darkness. At the same moment white-hot sand began to fall, which penetrated everywhere like snow, and immediately killed everyone on deck. After about an hour and a half the fall of white-hot ash stopped.

Referring to the condition of St. Pierre when he visited it, Mr. Whatman says:—

There was no lava thrown out; nothing but this fine sand, which was evidently white hot. Judging from what the few saved said and from what I myself saw and could judge from the position of the bodies, I have little doubt that everyone who was not under cover at the time the sand began to fall was killed in less than two minutes. The rest must have survived for a very short time longer, as they must have been quickly suffocated by the heat from the falling sand, not to mention the fact that the whole town must have caught fire at the same moment. A tremendous blast of air must have crossed from north to south, as all trees have been uprooted, and their remains are all pointing with roots towards the volcano. The lighthouse also fell in the same direction.

A message from the Acting Governor of Martinique states that from the further exploration of St. Pierre it would seem as if the southern portion of the town was destroyed by an as yet unexplained phenomenon, which acted with lightning-like rapidity, and has left traces as of a violent storm sweeping from north to south. The rain of ash which preceded, accompanied

<sup>1</sup> One opaque crystal only seemed to evolve a slow stream of bubbles, as if they came from a cavity in it. Whatever the gas was it dissolved in the liquid very rapidly, the bubbles visibly diminishing almost to nothing in ascending through the very shallow stratum of liquid above the crystal.

and followed this phenomenon covered the surface of the land to a depth of between twenty-five and thirty centimetres. The northern part of St. Pierre is buried beneath a mass of mud.

From the *Observer* we learn that the Deputy-Mayor of St. Martinique, who left St. Pierre just fifty minutes before the catastrophe took place, and was a witness of all the circumstances which led up to it, has given a new account of the condition of the volcano before the eruption. He says that shortly before St. Pierre was overwhelmed, immense fissures, caused by the earthquake, appeared in the side of Mont Pelée, reaching down to the edge of the sea. Into these the sea water rushed, and it was the contact between the water and the burning lava from the volcano which caused Mont Pelée practically to blow up like an overheated boiler.

The *Standard* records some observations made by Prof. R. T. Hill, a member of the United States Geological Survey, who went with Prof. Heilprin to Martinique to observe the volcanic phenomena and effects. Prof. Hill made his observations at a distance of five miles from Mont Pelée. On May 26 he observed what is usually described as lightning playing through the mushroom-shaped cloud overhead, like a sheet covering the country up to ten miles from the crater. These flashes occurred with alarming frequency, and they followed distinctly horizontal paths, hence they are

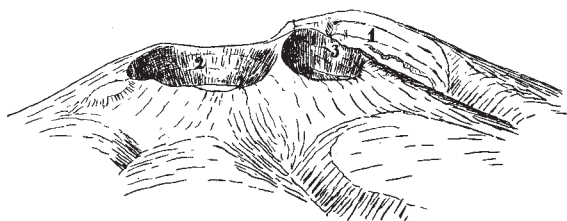


FIG. 1.

believed to be effects produced by the explosive combustion of gases leaving the Mont Pelée crater.

Mr. G. Kennan, who reached the new crater near Ajoupabouillon, at the head of the river Falaise, which is boiling hot, reports that a large section of the side of Mont Pelée has fallen, leaving a huge perpendicular cliff, in which there are five immense tunnels or cavities.

Dr. Hans Reusch, director of the Geological Survey of Norway, has sent us the following description of the crater of the Soufrière of St. Vincent as he found it in 1892:—

During a visit to the West Indies in 1892 I ascended the volcano now so much spoken of on the northern end of St. Vincent. When I was at the top I drew the accompanying bird's eye view from the south (Fig. 1).

It may be of some interest to compare this with the changes which undoubtedly have taken place during the recent eruptions. The crater numbered 1 is the remnant of an old very wide crater—some kind of Monte Somma (of Vesuvius). The height is given on the maps as 4043 feet above the sea. No. 2 is "the big crater," the breadth of which I estimated to be 1 kilometre. The bottom is filled with a lake of bluish-green opaque water, the colour being due to sulphur in fine powder. I calculated the vertical distance from the lake to the lowest point of the brim to be about 150 metres. The dip of the inner sides of the crater was about 60°. The slopes were mostly covered with bushes, but a stratification of the tufa was marked by horizontal lines. The small crater, No. 3, is about half as large as the other one, but comparatively deep. The stratification of its sides is inclined at about 20° in a northerly direction. It is a "steam hole" blown out somewhat to the side of the chief place of eruption. On the bottom lies a little pond of clear water, the rest of the bottom being covered with loose material washed down from the sides of the crater. The only sign of volcanic activity was a little smoke now and then

issuing from a small cleft near the pond; a sulphurous odour was also perceptible. The great eruption in 1812 was exclusively, or at least in greater part, an ash-eruption, as no lava stream was seen on the exterior of the mountain. A few insignificant beds of andesitic lava still occur interstratified in the tufa.

Someone told me that the island was rising slowly out of the sea on its western and sinking on its opposite side; this, however, was denied by others. If any change of importance has taken place on the western side during the last convulsion of Nature, it should not be difficult to ascertain the fact and determine the amount of change of level. I went in a boat along the coast from Château Belair to Kingstown and observed that where the coast consisted of tufa (not where it was formed of solid lava or coarse volcanic agglomerate) it displayed a kind of strandline or beach-shelf. It was a horizontal or slowly dipping platform about a yard broad. Fig. 2 shows the shelf along a promontory seen from some height, Fig. 3 represents a small island surrounded with its beach-shelf, while Fig. 4 gives a diagrammatic section of the shelf.

The sea at high water rises about one foot above the shelf and sinks at low water about 2 feet underneath it. At ebb-tide the outer slope is seen to be covered with seaweed (at x in the diagram), as far up as the sea rises the inner wall (at y) is covered with a crust of calcareous matter consisting of serpulites and the remains of other sea animals. I cannot suppose that this peculiar beach was due solely to the action of the waves. Organic life has probably had something to do with it, the rate of recession of the cliff being comparatively rapid where the animals lived, while on the other hand the seaweed has been to a certain extent



FIG. 2.

FIG. 3.

FIG. 4.

protective. In any case this beach-shelf should be of good service in determining whether any sudden change of level has taken place during the latest eruptions.

Christiania.

HANS REUSCH.

A comparison of Dr. Reusch's observations with those which, it is hoped, will shortly be obtained, should be of value in showing the changes which have occurred.

The Paris Academy of Sciences has decided to send a special scientific expedition to the scenes of the eruptions. The expedition will sail on June 9.

In extension of the diary of recent volcanic events already published in these columns, we give a record of occurrences reported during the past week.

*May 10, Tacoma.*—Mount Redoubt, in Cook Inlet country, Washington State, has been pouring forth dense volumes of smoke for a week past, and a few nights ago became luminous. Volcanic ashes have been falling for several days, and the snow near the mountain is covered with ashes. The last eruption of Mount Redoubt was in 1867.

*May 28.*—A sharp shock of earthquake was felt in the Cape Peninsula at midnight.

*May 28, Fort de France.*—There was a tremendous explosion, followed by a cloud of black smoke, from Mont Pelée at 8.45 this morning.

*May 29, Fort de France.*—The eruptions of Mont Pelée have become more frequent, although less violent.

*May 30, Kingstown (St. Vincent).*—There was a fresh eruption of the volcano La Soufrière this morning. It was accompanied by a thunderous noise and trembling of the earth, while volumes of vapour were emitted from the crater. The eruption lasted an hour.

*May 30, Fort de France.*—Cable communication with St. Thomas was again broken. A violent eruption of Mont Pelée took place at 2 p.m. It is reported that the craters on the north side of the mountain are pouring out torrents of mud.

*May 31, Fort de France.*—Detonations were heard from the

volcano this morning, and volumes of smoke were emitted. The Rivière Blanche is again a torrent of steaming hot mud.

*May 31, Kingston.*—During the past week Jamaica has been experiencing magnificent sunsets, the colours being extraordinarily rich and beautiful. The phenomenon is due to the volcanic dust in the atmosphere.

*May 31, Athens.*—For some days past earthquake shocks have been repeatedly felt in various parts of Greece.

#### DR. HENRI FILHOL.

DOCTOR HENRI FILHOL, professor of comparative anatomy at the Museum of Natural History, Paris, died on April 28 at the relatively early age of fifty-nine. A naturalist and palaeontologist of the first rank, he will assuredly be lamented by a large circle of friends, not only in his native land, but also in this and other countries, his many and important contributions to our knowledge of both living and extinct animals being of world-wide interest.

Henri Filhol, son of Edouard Filhol, the famous chemist of Toulouse, was born in that town in the year 1843. Having studied for the medical profession, he early obtained his degree of doctor of medicine. His first contribution to science appears to have been in 1863, when he was about twenty years of age, for at that time was published, in conjunction with M. F. Garrigou, his paper on "L'Age de la Pierre dans les Cavernes de la Vallée de Tarascon (Ariège)" (*Comptes rendus*, lvii.). The French commission sent out for the study of the transit of Venus in 1875 included Dr. H. Filhol among its members; and the fact that in 1876 he received the Lalande-Guérineau prize of the Academy of Sciences is evidence of his confrères' appreciation of these early labours for science.

One of Dr. Filhol's most remarkable pieces of work was his "Recherches sur les Phosphorites du Quercy" (*Ann. Sci. Géol.* 1876, t. vii. pp. 220, pls. 10-36, and 1877, t. viii. pp. 1-273 and 297-340, pls. 1-26). In this are described the remarkable deposits of phosphate of lime, of Upper Eocene age, which occur as great pockets in Jurassic beds in the departments of the Lot, of the Tarn and Garonne, and of the Aveyron; then follows, as the subtitle of the work says, an account of the fossils met with in these deposits and especially the Mammalia. Numerous new forms are brought to light, and others critically revised, in this memoir of more than 500 pages and 52 plates.

Another work of similar character is the "Étude des Mammifères Fossiles de Saint-Gérard le Puy (Allier)" (*Ann. Sci. Géol.* 1879, t. x., and 1880, t. xi.), which occupies some 338 pages and 51 plates, and was the result of studying numerous collections of fossils, made during many years, from these Lower Miocene deposits. Here again numerous forms are described, many being regarded as new to science. A third work is entitled "Étude des Mammifères Fossiles de Ronzon" (*Ann. Sci. Géol.* 1881, t. xii. pp. 270, pls. 6-31). The locality is near the village of Puy, and the calcareous marl which has yielded this great assemblage of fossil vertebrata is believed to be of Miocene age. Many mammalian remains from the locality had already been collected and described by M. Aymard (1856); but not only are these critically revised in the light of new material, but again new forms are made known. A fourth piece of work of the same kind is the "Études sur les Mammifères Fossiles de Sansan" (*Ann. Sci. Géol.* 1891, t. xxi. pp. 314, pls. 46). M. E. Lartet had begun the study of the remains from this Miocene deposit, but died suddenly, leaving the work uncompleted. Dr. Filhol, taking up the study of the extensive material preserved in the Paris Museum, and with the help of additional specimens collected by himself under the auspices of the same museum, produced this important memoir.